official organ of the Wild Flower Preservation Society of America was approved. Hereafter notices to the members, and other matter of interest to them will appear in TORREYA,* and reprints of such notices will be made as occasion demands and mailed to members of the Society and others.

In connection with the button, mentioned above, one has been sent to each member of the Society and additional buttons will be furnished at the rate of 2 cents each, or $1.50 per hundred. It is hoped that they will have a wide usefulness for school children and others.

Application for extra buttons, or any other information about the Society's business should be sent to the new secretary-treasurer,

NORMAN TAYLOR

BROOKLYN BOTANIC GARDEN,
BROOKLYN, N. Y.

COMMON MOSSES ACCORDING TO HABITAT. A NON-TECHNICAL DESCRIPTION BASED ON MACROSCOPICAL CHARACTERS

BY DAISY J. LEVY

(*Continued from March Torreya, p. 67*)

DESCRIPTION OF ACROCARPOUS SPECIES

AULACOMNIUM.

A. heterostichum.

Capsules wrinkled when dry. Costa ends below the apex. Capsule contracted. Operculum long rostrate. Plant radiculose. Mature in spring.

A. palustre.

Leaves light colored, long lanceolate, bearing numerous pseudopodia; serrate at apex, revolute below; erect spreading; transversely undulate; costa ending below the apex. Capsule curved, unsymmetric, plicate when dry. Operculum long beaked. Seta long. Plants light colored, yellow green; very tomentose. Mature in early summer.

BARBULA.

Leaves erect spreading, mucronate, margin recurved below; costa usually ends below the apex. Capsule small. Seta yellow; operculum beaked. Small tufted plants. Mature in winter.

* The subscription price of TORREYA is one dollar a year and subscriptions may be sent to Dr. B. O. Dodge, department of botany, Columbia University, New York City.

BARTRAMIA.

B. pomiformis.

Leaves costate, serrate, long acuminate, narrow. Usually papillose, yellow green, revolute below. Seta short. Capsule globose, striate. Plants robust, forming large wooly tufts in wet cool places. Mature in spring.

BRYUM.

The capsule of the *Bryum* is unsymmetric, inclined or pendulous, fairly large, mostly pear-shaped. Seta is long. Operculum conical. Plants vary in size.

B. argenteum.

This species is found in dry soil between rocks or cracks in wall. They are small, silver gray in old plants. Costa ends below the apex. Plants small, julaceous. Seta dark red. Mature in autumn.

B. bimum.

Leaves acuminate, serrate at apex, decurrent, margin revolute, costa red or purple. Capsule pendent or pyriform, inclined. Plants moisture-loving, large bright green, loosely cespitose. Mature in summer.

B. caespiticium.

This is our most common form. Leaves mostly entire, acuminate, with costa excurrent, ovate lanceolate, margin revolute, slightly serrate, imbricate, narrowly acuminate. Capsule horizontal or pendent, oblong pyriform. Cells of the leaf narrow at margin. Plants form dense tufts on dry soil; they are bright green, of medium size. Mature in spring or summer.

BUXBAUMIA.

B. aphylla.

Capsule ventricose, exserted, oblique. Leaves few at base. No chlorophyll. Protonema brown. Plants very minute. Found on the ground or on rotten wood. Mature in spring.

CATHARINAEA.

C. angustata.

In the genus *Catharinaea*, the calyptra is conical, the capsule cylindric. The leaves are bordered, large, obtuse, but not so serrate as in *undulata*. Costa is wider, the leaves narrower. Plants found in dry, more open situations.

C. undulata.

Resembles the above, but the leaves are strongly undulate transversely, while the costa occupies but a smaller part of the leaf. Plants are densely cespitose, and grow in moist shady places. Both forms of *Catharinaea* mature in autumn or winter.

CERATODON.

C. purpureus.

A common moss of fields, pastures and roadways. Leaves costate, entire, acuminate, long lanceolate, with margin revolute. Apex slightly serrate, often reflexed. Capsule dark red, horizontal, ovate oblong, striate, sulcate when dry, neck short. Plants dark green, growing close together, of medium size. Mature in spring.

CONOMITRIUM.

C. Julianum (*Fissidens Julianus*).

Plants large, 2 to 6 inches in length, filiform, floating, leaves distant, linear lanceolate, with *Fissidens* habit, with leaves placed flat and arranged in one plane. Seta short. Found on stones in running brooks.

DICRANELLA.

D. heteromalla.

Calyptra cucullate. Leaves narrow, secund, base broad, apex subulate, channeled, serrate at tip. Seta yellow. Capsule cylindric mostly erect, plicate when dry. Plants small forming dense silky tufts, of yellow green color. Mature in spring and winter.

DICRANUM.

D. scoparium.

A common form of *Dicranum.* Plants forming large tufts, yellow green. Leaves large falcate secund, dense and silky. A common plant along wood paths and around the base of trees. Mature in summer or autumn.

DITRICHUM.

D. pallidum.

Leaves serrate, acuminate, lanceolate, costa long excurrent, margin recurved. Seta yellow. Plants small, caespitose, dull green. Mature in spring.

D. tortile.

Closely resembles *Ditrichum pallidum,* but the costa is short excurrent, seta is red or orange, and matures in the autumn.

DRUMMONDIA.

D. clavellata.

A tree loving form. Calyptra cucullate. Capsule symmetric, erect, ovate, globose. Leaves open erect, ovate lanceolate. Costa ends below the apex. Forms dark green tufts. Seta long. Stem long.

FISSIDENS.

The genus *Fissidens* is characterized by flat plane of growth. The leaves are distichous, that is they are two ranked, forming two opposite rows. Only a genus description can be given, for the species require microscopical examination. For the long floating form found in the water see *Conomitrium Julianum,* also called *F. Julianus. Fissidens incurvus* is often found on stones. Other species of *Fissidens* are common on soil in deep woods.

FUNARIA.

F. hygrometrica.

Capsule unsymmetric, inclined, oblique; its mouth is turned to one side, it is pyriform and gibbous. Seta is twisted or cord-like, therefore it is called the cord moss. It forms dense tufts on barren soil or burnt waste places. Plants of medium size, mature in summer. Leaves are serrate, acute or obtuse.

GEORGIA.

G. pellucida.

Capsule cylindric, mostly erect, green with operculum reddish when

young. Leaves blunt, entire, costa ends below the apex. Seta long and twisted. Slender cups are often found at the apex of the branches, these cups contain little green bodies called gemmae. These gemmae are able to propagate the plant asexually. The plants are found on decayed trunks and mature in summer.

GRIMMIA.

The genus *Grimmia* is characterized by its smooth calyptra. Capsule ovoid symmetric, often immersed. Leaves are costate, entire, acuminate. They spread somewhat when moist, are usually hyaline at the apex. The margin is often recurved and they are lanceolate in shape. The plants are small, light green above, black below, they are tufted, are always to be found on rocks. Mature in the spring. Species determination depends upon microscopical examination.

HEDWIGIA.

H. albicans.

The capsule is always immersed and spherical in shape. The leaves are ecostate, entire, acute, serrate and hyaline at tip. The plants appear hoary at top but are black at base. They spread when moist. They are of medium size and mature in spring. Leaves are recurved and concave. Mature in spring.

LEPTOBRYUM.

L. pyriforme.

This is one of the *Bryum* group and like them it has an unsymmetrical, inclined capsule which in this species is pear-shaped. Leaves are long acuminate running off into a long hair-like point. The base of the leaf is broad; costa excurrent. Apex is serrate. Cells of the leaf are narrow and linear. Plants are pale shining green and form rather large tufts. Mature in spring and summer.

LEUCOBRYUM.

L. glaucum.

Capsule cylindric, with cucullate calyptra. Leaves ovate, enclosed with hyaline cells, obtuse or acute, costate, entire. Plants form large dense white cushions in deep woods. They are of medium size. Mature in spring, or winter.

MNIUM.

The plants of this genus are large, forming loose wide tufts in deep woods, loving moist substratum. The plants form stolons and are usually woody and tomentose. Capsule large, unsymmetric and inclined. Leaves serrate, costate, usually acute or obtuse, large and oval. Seta long.

M. cuspidatum.

This is the early spring form. The leaves are bordered, serrate with single teeth in the upper half only. Capsule single.

Other common forms of *Mnium* are:

M. hornum with serrate leaves and teeth in pairs. Costa vanishing below the apex.

M. punctatum with leaves costate to the apex, entire and minutely apiculate.

M. punctatum var. *elatum*, the costa vanishes below the apex. The leaves are very large.

ORTHOTRICHUM.

O. anomalum.

This form is usually found growing on stones. The calyptra is very hairy and the capsule is exserted. The leaves are costate, entire, acuminate, ovate in shape. Plants form large dense cushions. They are dark green. Mature in spring.

O. strangulatum.

Calyptra mitrate, naked, capsule cylindric. Leaves costate, entire, acute or obtuse. Margin of leaf revolute. Plants small, growing on trees. Mature in spring.

PHASCUM.

P. cuspidatum.

These plants are very minute, with the capsule immersed. The calyptra is cucullate. The capsule is globose or ovate oblong, with an apiculate operculum. The leaves are entire, acuminate, with an excurrent costa. They are ovate to ovate-lanceolate, often revolute in the upper part. The plants are dark green, densely tufted. They grow in waste places, in fields, and on clay banks. Mature in spring.

PHILONOTIS.

P. fontana.

Calyptra cucullate. Capsule globular. Leaves costate, serrate, acuminate, revolute, ovate lanceolate. One or two plicae on either side of the costa. Costa usually excurrent. Capsule large and brown, striate. Seta dark red. Plants form large tufts, aquatic or semi-aquatic. They are usually yellow green. Medium to large. Mature in spring.

PHYSCOMITRIUM.

P. turbinatum.

Capsule urn shaped. Leaves costate, entire, acute. Costa ends below the apex. Leaves are obovate, often serrate above the middle. Plants are small, bright green, growing in open places. Mature in spring. *Physcomitrium* closely resembles *Pottia*, but *Pottia* matures in the autumn, and its costa is excurrent.

POGONATUM.

P. brevicaule.

This species is easily recognized by the persisting protonema, which forms a soft green felt like mass on fresh turned clay banks. Leaves are very few and grow at the base of the plant. Calyptra is conical and hairy. The capsule cylindrical. The leaves are costate, serrate. On the back of the leaf, the costa forms outgrowths called lamellae. The margin of the leaf is spinulose. The plants are one or two inches high and form a pretty cluster with the glistening white of the operculum or calyptra. Mature in autumn.

POHLIA.

P. nutans.

One of the prettiest of the spring mosses. It resembles *Bryum caespiticium*, but the choice of habitat is peculiar to each. The *Bryum* prefers dry open situations, the *Pohlia* prefers moist soil in deep woods. The

capsule is unsymmetric, inclined, yellow brown at maturity. The leaves are serrate, acuminate, yellow green, linear lanceolate. The costa is thick and reddish. Mature in summer and spring.

POLYTRICHUM.

The Polytrichums are all large mosses and are among our most common forms. They grow from underground stems, and bear lamellae on the back of the leaf. Capsules are borne on long seta and are angled. Male plants are easily distinguished by the arrangement of the leaves at the summit of the plant in rosettes. The calyptra is densely hairy. Our two most common forms are described below.

P. commune.

The leaves are costate, serrate, open recurved, long sheathing. Capsule is sharply angled, cubical with short beak. Operculum short, seta long. Plants large, very loosely cespitose, in woods or open fields. Mature in spring.

P. ohioense.

Closely resembles the preceding. The capsule, however, is longer than broad, with a long beak. The beak is tapering. It grows in deeper woods and in more moist situations.

POTTIA.

P. truncatula.

Capsule is urn shaped. Leaves are costate, entire, acute and mucronate. They are ovate and oblong. The costa is excurrent. Seta short and slender. Plants grow in open ground, form loose mats, small, dull green in color. *Pottia* resembles *Physcomitrium* from which it differs in the excurrent costa and in time of maturity. *Pottia* matures in the autumn.

PTYCHOMITRIUM.

P. incurvum.

Calyptra is plicate. Capsule oval, erect. Leaves crispate when dry, erect, incurved when wet. The leaves are linear lanceolate, entire, with a costa which reaches to just below the apex. The apex is acute. The plants grow on rock, forming dark green, dense cushions. Plants mature in winter or in early spring.

RHACOMITRIUM.

R. aciculare.

A form difficult to distinguish without the aid of a microscope which will reveal the sinuose walls. This species closely resembles *Grimmia*, but the plant is much larger, and is found in subalpine regions on wet rocks. The leaves are costate, not hyaline tipped. The margin is recurved, it is entire, with a few low teeth at the apex, which is round-obtuse. The leaf is ovate-oblong in shape. The calyptra is mitrate, long-beaked, smooth. The capsule is exserted. The seta is erect and straight. Mature in the spring.

RHODOBRYUM.

R. roseum.

The capsule is fairly large, clustered, pendent, smooth. Seta long, operculum conical, apiculate. The leaves are costate, serrate, obtuse.

The plants are found in cool moist places in deep woods. Mature in autumn. They are large and *Mnium*-like, often called the giant *Bryum*. They grow from stolons, the leaves are clustered at the top of the stem, forming rosettes. The plants are deep green in color, and form large loose mats.

SPHAGNUM.

The *Sphagnums* or peat mosses are the large, light, almost white, green mosses found in bogs or in stagnant water. The genus only can be described, for the microscope is necessary for species determinations. The capsules are globular. The leaves are ecostate, entire, acute, translucent. The plants grow in compact masses. Mature in summer.

TORTELLA.

T. caespitosa.

This species is usually found upon trees. The calyptra is cucullate. The leaves are costate, entire, acuminate. The costa is mucronate, excurrent. Margin plane. Leaves linear lanceolate, spreading when moist, spirally contorted when dry. Basal cells hyaline. Plants caespitose, radiculose, of medium size. Yellow green. Mature in spring.

T. tortuosa.

This form is found upon stones. The leaves are linear lanceolate, acuminate, spreading when moist. The costa is excurrent. Densely imbricate in habit, with undulate leaves. Plants medium to large. Mature in late summer.

TORTULA.

T. muralis.

Leaves oblong, obtuse, margin revolute. Costa yellow, excurrent to a long hyaline point about ½ the length of the leaf. Cells papillose. Capsule ovate-oblong, sub-cylindric. Seta purple. Operculum long beaked. Tufts small, forming dense white-green cushions on stones and rocks. Mature in spring.

ULOTA.

U. americana.

This *Ulota* is always found on rocks. Calyptra hairy. Capsules erect and symmetric, exserted. Leaves costate, entire, acuminate, lanceolate, curly when dry. Capsule is striate with a long neck. Plants black-green. Mature in spring.

U. crispa.

This *Ulota* is to be found on trees. It agrees with the above form in calyptra and capsule characters. The leaves are costate, entire, acute, ovate, crispate when dry. Hyaline cells at base of leaf. Plants form dense cushions. They are small, bright green. Mature in spring or early summer.

WEBERA.

W. sessilis.

This is a unique, form growing close to the ground in dense mats. The capsule is ventricose, immersed, surrounded by a tuft of hairs and almost sessile on the gametophyte. The leaves are lanceolate-acuminate. Its habitat is a soil bank in deep woods. Mature in summer.

WEISIA.

W. viridula.

Calyptra cucullate. Capsule cylindric. Leaves costate, entire, acuminate, erect spreading, mucronate, margin involute, upper leaves larger than the lower. Capsule plicate when dry. Operculum long beaked. Plants small, forming tufts on soil usually dry or sandy. Plants bright green. Mature in spring.

PLEUROCARPOUS FORMS

I. In woods, on humus, ground, or decaying logs

B. OPERCULUM CONIC TO SHORT ROSTRATE.

C. CAPSULE OVOID, INCLINED.

D. Costate.
E. Serrate.
F. Acuminate.

Bryhnia Novae-Angliae.
Brachythecium.
Hylocomium.

CC. CAPSULE OVOID, ERECT OR SUB-ERECT.

D. Costate.
E. Serrate.
F. Acuminate.

Brachythecium cyrtophyllum.
acuminatum.
oxycladon.

CCC. CAPSULE CYLINDRIC, INCLINED.

D. Costate.
E. Entire.
F. Acuminate.

Campylium chrysophyllum.
Hypnum Haldanianum.

EE. Serrate.
F. Acuminate.

Campylium hispidulum.
Amblystegium.
Hypnum (Ctenidium) molluscum.
(Stereodon) imponens.
(Stereodon) reptile.
(Ptilium) Crista-castrensis.
Cratoneuron.

DD. Ecostate or costa short and double.
E. Entire.
F. Acute.

Plagiothecium.
Calliergon Schreberi.

EE. Serrate.
F. Acuminate.

Hypnum (Stereodon) Patientiae.
(Stereodon) imponens.
(Stereodon) reptile.
Plagiothecium.

CCCC. Capsule cylindric, erect or sub-erect.

D. Costate.
E. Serrate.
F. Acute.

Climacium.
Anomodon rostratus.

DD. Ecostate, or costa short and double.
E. Entire.
F. Acuminate or acute.

Hypnum Haldanianum.
Entodon.

BB. Operculum long rostrate.
C. Capsule ovoid, inclined.

D. Costate.
E. Serrate.
F. Acuminate or acute.

Cirriphyllum Boscii.
Eurhynchium.

CC. Capsule cylindric, inclined.

D. Costate.
E. Serrate.
F. Acuminate.

Thuidium.

EE. Entire.

Thuidium.

DD. Ecostate.
E. Serrate.
F. Acuminate.

Hypnum recurvans.

II. Bark of trees

1. Above the base

C. Capsule cylindric, erect, exserted.

D. Ecostate or costa faint.
E. Serrate.
F. Acuminate.

Pylaisia Schimperi.

CC. Capsule cylindric, immersed or exserted.

D. Ecostate or costa faint.
E. Entire.
F. Acute.

Neckera pennata.

2. Near the base

C. Capsule cylindric, erect.

**Erect, exserted.*

D. Costate.
E. Serrate.
F. Acute.

Thelia.

EE. Entire.
F. Acuminate.
Anomodon.

DD. Ecostate or costa faint.
E. Entire.
F. Acute.
Entodon.

****Erect, immersed or exserted.***

D. Ecostate.
E. Entire.
F. Acute or acuminate.
Leucodon.
Neckera pennata.

CC. CAPSULE CYLINDRIC, UNSYMMETRIC, HORIZONTAL OR INCLINED.

D. Costate.
E. Serrate.
F. Acuminate.
Hypnum (Stereodon) reptile.
Thuidium scitum.

DD. Ecostate or costa faint.
E. Serrate.
F. Acuminate.
Hypnum recurvans.

EE. Entire.
F. Acute.
Amblystegiella adnata.

CCC. CAPSULE OVOID, ERECT OR INCLINED.

D. Costate.
E. Serrate.
F. Acuminate.
Brachythecium salebrosum.
acuminatum.
Thuidium.

EE. Entire.
F. Acute.
Leskea.

3. ABOUT THE ROOTS

C. CAPSULE ERECT OR INCLINED.

D. Costate.
E. Serrate or entire.
F. Acuminate.
Campylium hispidulum.
Anomodon attenuatus.

DD. Ecostate or costa faint.
E. Serrate.
F. Acuminate.
Hypnum (Stereodon) imponens.
reptile.
Plagiothecium.

CC. Capsule ovoid, erect or sub-erect.

D. Costate.
E. Serrate.
F. Acuminate.

Brachythecium.

III. Aquatic or sub-aquatic

C. Capsule cylindric.

D. Costate.
E. Entire.
F. Acuminate.

Scorpidium scorpioides.
Amblystegium irriguum.
fluviatile.
riparium.
Dichelyma.

FF. Acute.

Hygrohypnum ochraceum.
Calliergon cordifolium.
Schreberi.

EE. Serrate.
F. Acuminate.

Drepanocladus.
Campylium chrysophyllum.
hispidulum.

FF. Acute.

Climacium.

CC. Capsule ovoid.

D. Costate.
E. Serrate.
F. Acuminate or acute.

Brachythecium rivulare.
plumosum.
Plagiothecium striatellum.
Eurhynchium rusciforme.
Hygrohypnum ochraceum.

CCC. Capsule sessile or sub-sessile.

D. Ecostate.
E. Entire.
F. Acute.

Fontinalis.

IV. Open fields, roadways, waste places

B. Calyptra cucullate.
C. Capsule cylindric, erect or cernuous.

D. Costate.
E. Serrate.
F. Acuminate.

Thuidium.
Thelia.

DD. Ecostate.
E. Serrate.

F. Acute or acuminate.

Hypnum.

EE. Entire.

F. Acute.

Calliergon Schreberi.

CC. CAPSULE OVOID, ERECT OR INCLINED.

D. Costate.

E. Serrate.

F. Acuminate.

Cirriphyllum Boscii.

Brachythecium.

(*To be continued*)

NOTES ON PHILIPPINE VEGETATION: THE CASUARINA ASSOCIATION

BY FRANK C. GATES

One of the most striking impressions one receives in different countries is a similarity of the appearance of vegetation, *en masse*, produced by entirely different plants. Even a second general look at the vegetation as a whole may not disclose the differences which, however, a closer observation reveals.

The vegetation of the sandy river-bottom flats in Central

FIG. 1. A general view of a grove of *Casuarina equisetifolia*. Villar, Zambales Province, December 24, 1914.

Zambales Province, Philippine Islands, furnishes an excellent example. As is shown in the figures, the resemblance of the